

CLASS – XII- SCIENCE

SUBJECT – HUMAN

REPRODUCTION

TEACHER – PARAMITA PAL

TOPIC : MAMMARY GLAND

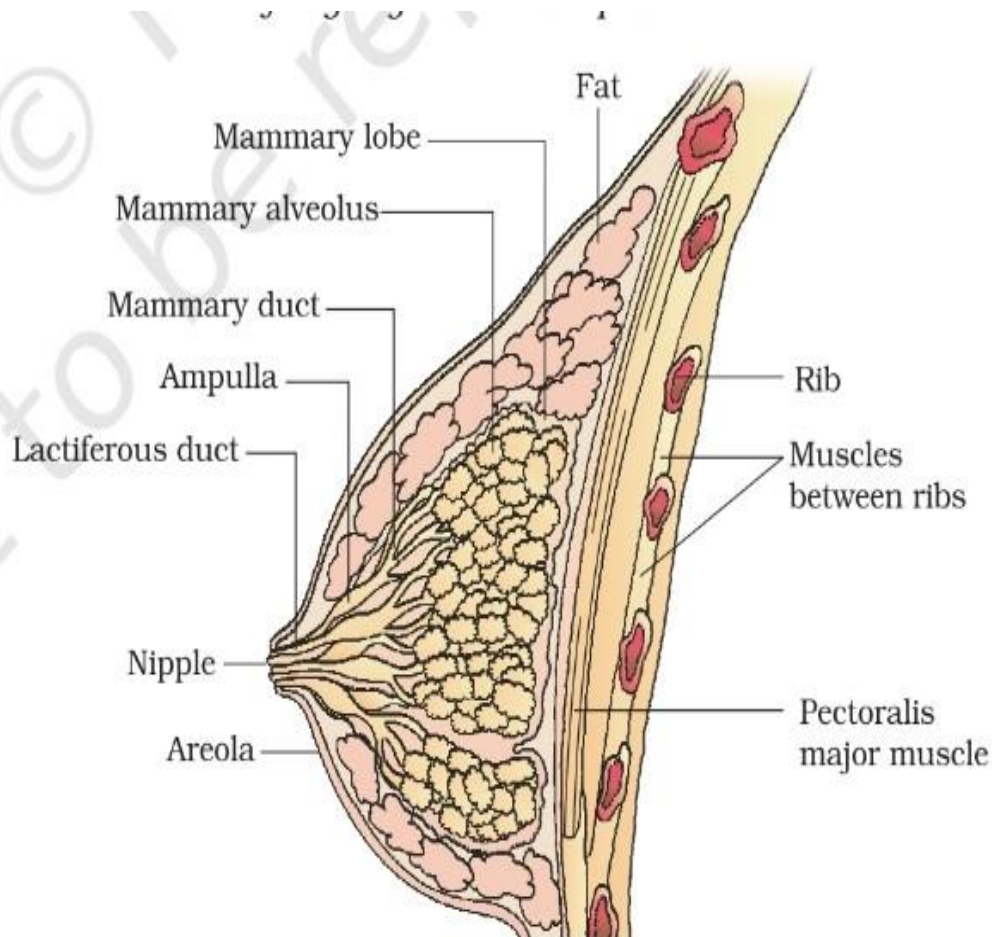


Figure 3.4 A diagrammatic sectional view of Mammary gland



A functional mammary gland is characteristic of all female mammals. The mammary glands are paired structures (breasts) that contain glandular tissue and variable amount of fat. The glandular tissue of each breast is divided into 15-20 **mammary lobes** containing clusters of cells called alveoli (Figure 3.4). The cells of alveoli secrete milk, which is stored in the cavities (lumens) of alveoli. The alveoli open into mammary tubules. The tubules of each lobe join to form a **mammary duct**. Several mammary ducts join to form a wider mammary ampulla which is connected to **lactiferous duct** through which milk is sucked out.

3.3 GAMETOGENESIS

The primary sex organs – the testis in the males and the ovaries in the females – produce gametes, i.e. sperms and ovum, respectively, by the process called gametogenesis. In testis, the immature male germ cells (spermatogonia) produce sperms by **spermatogenesis** that begins at puberty. The **spermatogonia** (sing. spermatogonium) present on the inside wall of seminiferous tubules multiply by mitotic division and increase in numbers. Each spermatogonium is diploid and contains 46 chromosomes. Some of the spermatogonia called **primary spermatocytes** periodically undergo meiosis. A primary spermatocyte completes the first meiotic division (reduction division) leading to formation of two equal, haploid cells called **secondary spermatocytes**, which have only 23 chromosomes each. The secondary spermatocytes undergo the second meiotic division to produce four equal, haploid **spermatids** (Figure 3.5). *What would be the number of chromosome in the spermatids?* The spermatids are transformed into **spermatozoa (sperms)** by the process called **spermiogenesis**. After spermiogenesis, sperm heads become embedded in the **Sertoli cells**, and are finally released from the seminiferous tubules by the process called **spermiation**.

Spermatogenesis starts at the age of puberty due to significant increase in the secretion of gonadotropin releasing hormone (GnRH). This, if you recall, is a hypothalamic hormone. The increased levels of GnRH then acts at the anterior pituitary gland and stimulates secretion of two gonadotropins – luteinising hormone (LH) and follicle stimulating hormone (FSH). LH acts at the Leydig cells and stimulates synthesis and secretion of androgens. Androgens, in turn, stimulate the process of spermatogenesis. FSH acts on the Sertoli cells and stimulates

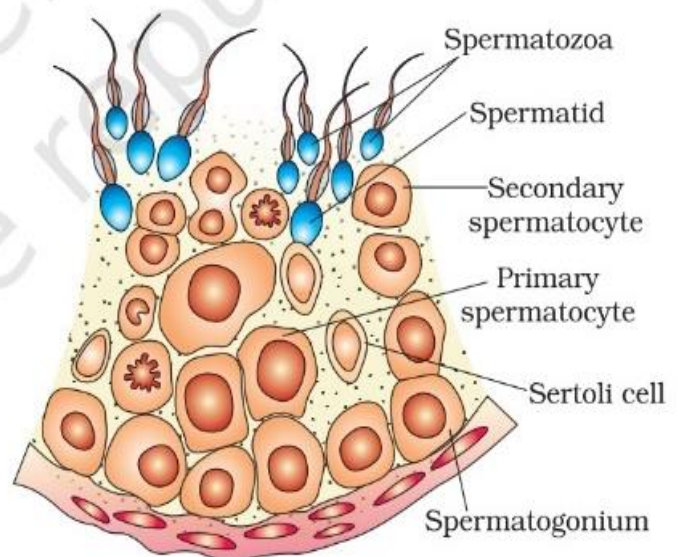
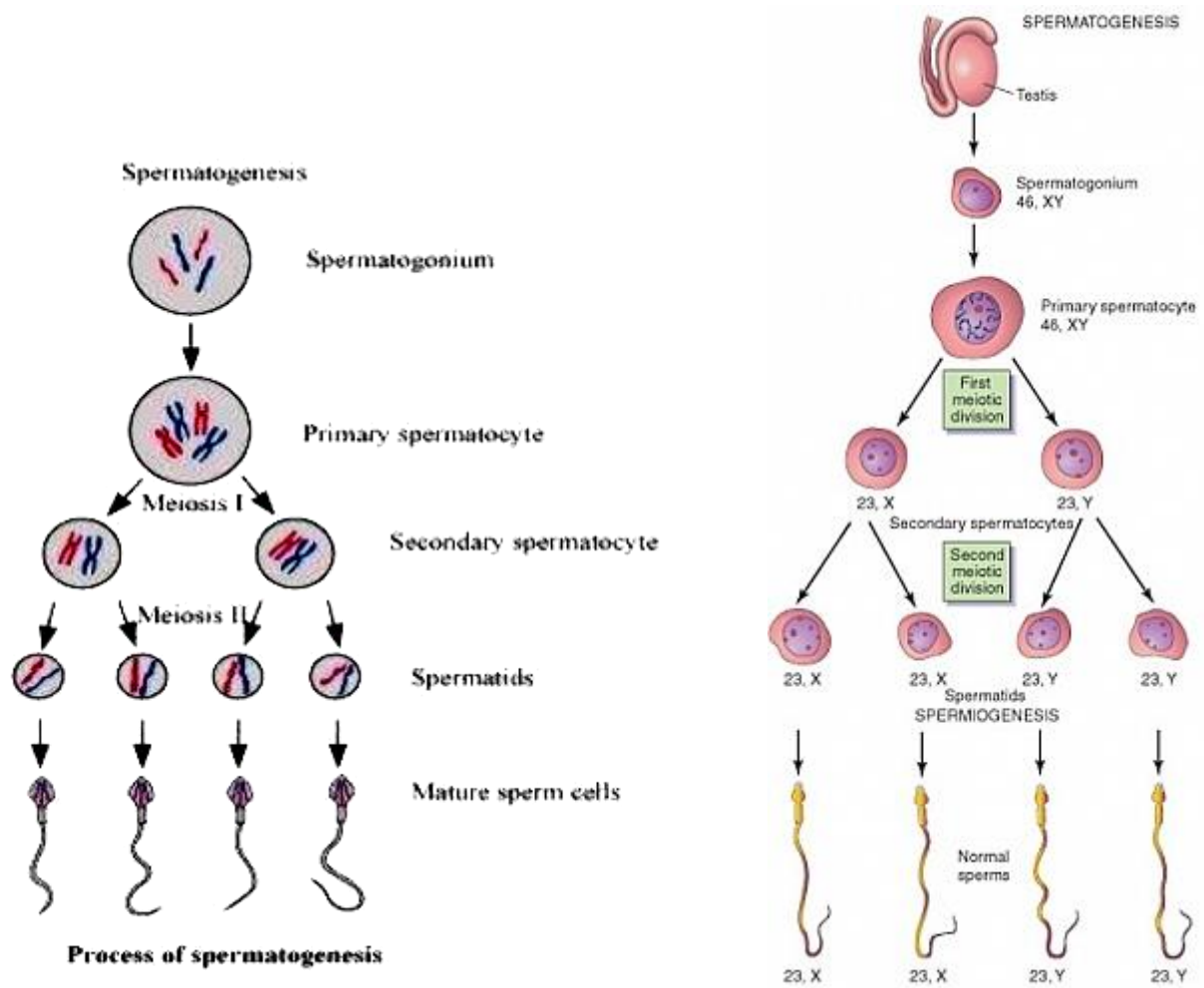
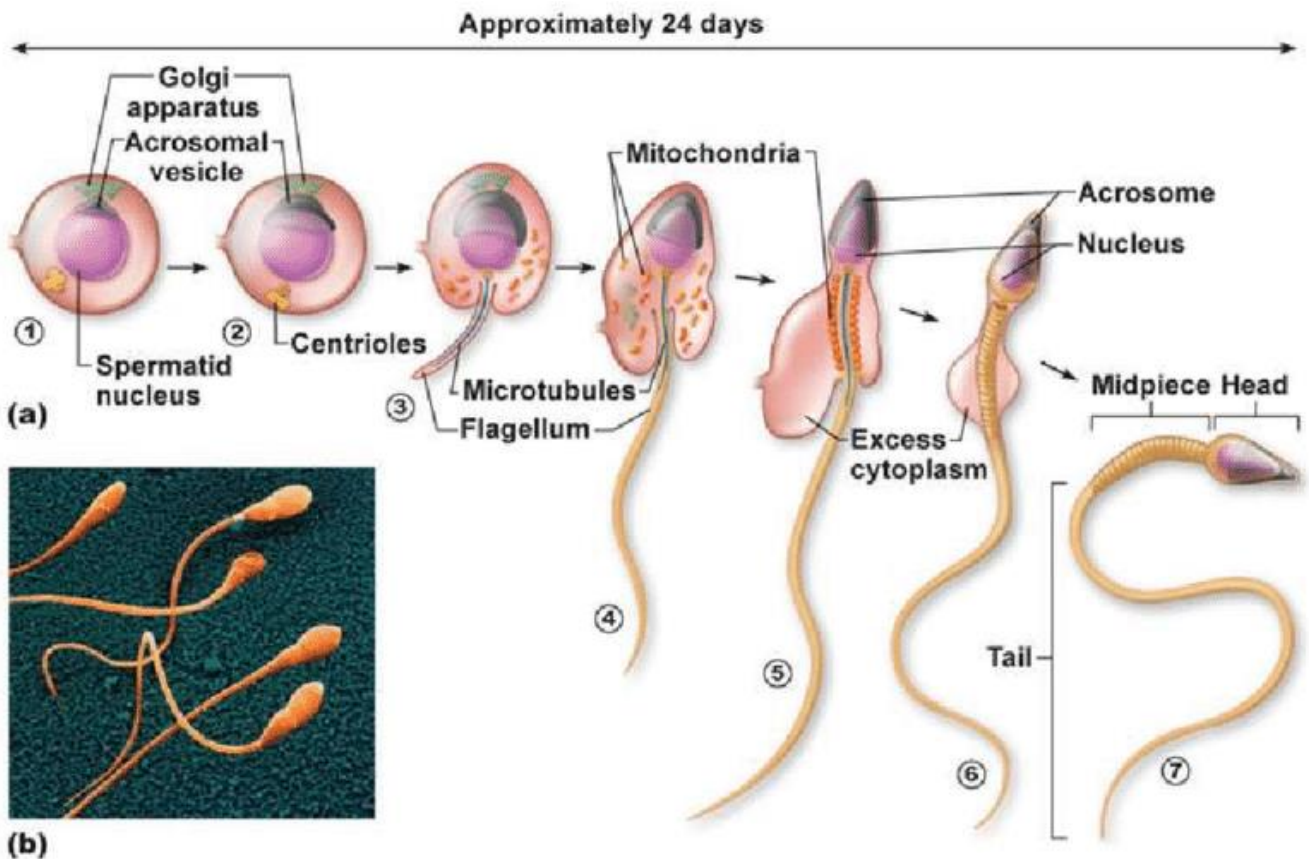


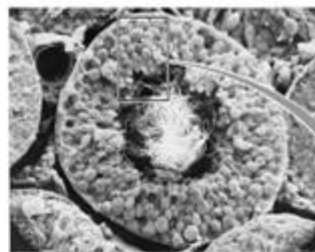
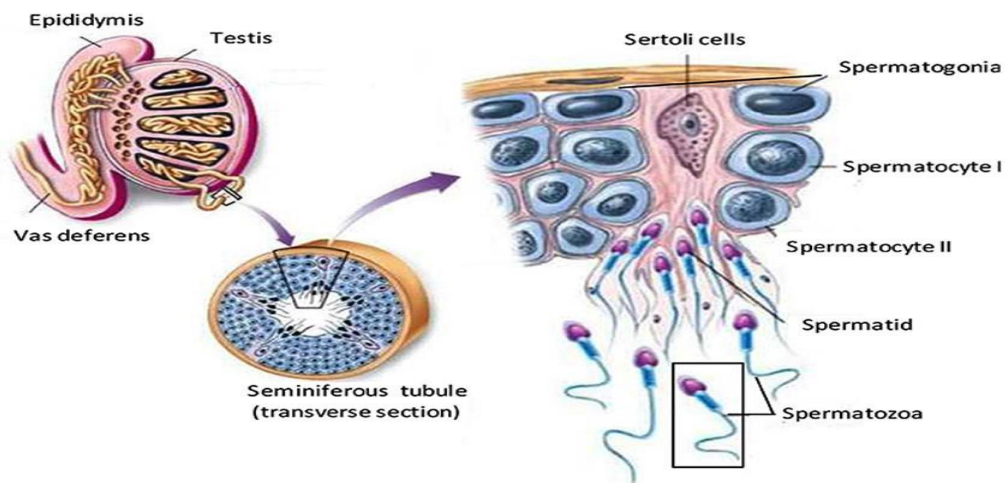
Figure 3.5 Diagrammatic sectional view of a seminiferous tubule (enlarged)



Process of spermiogenesis



Process of spermiation:



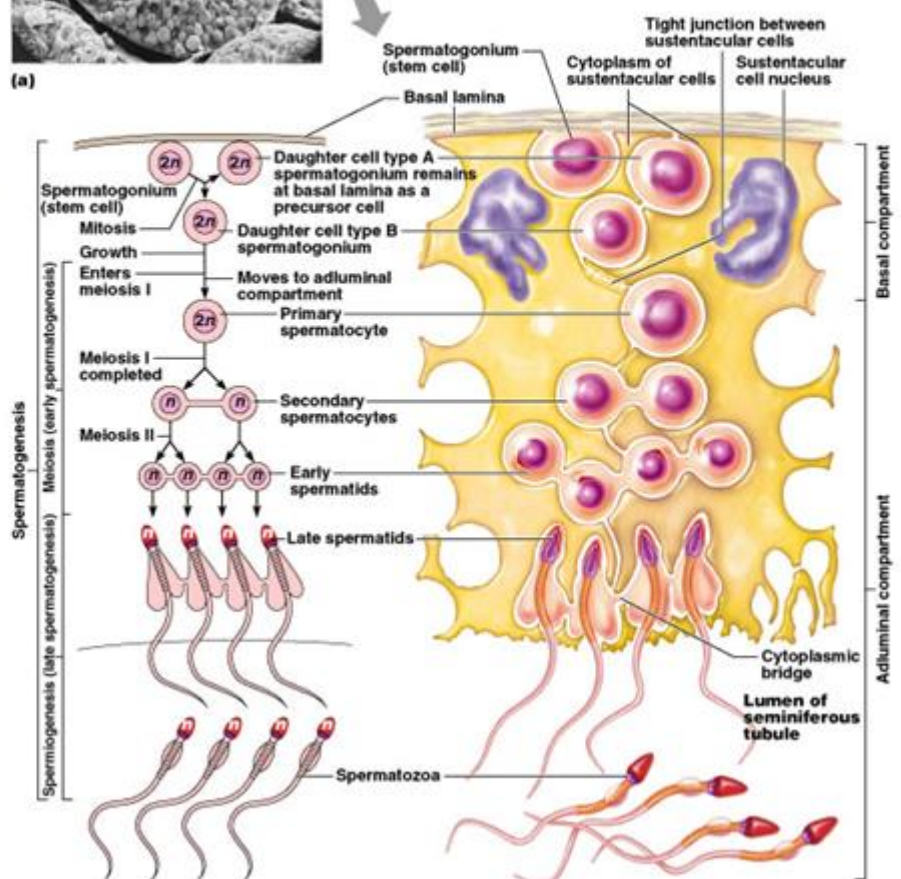
(a)

Spermatocytogenesis

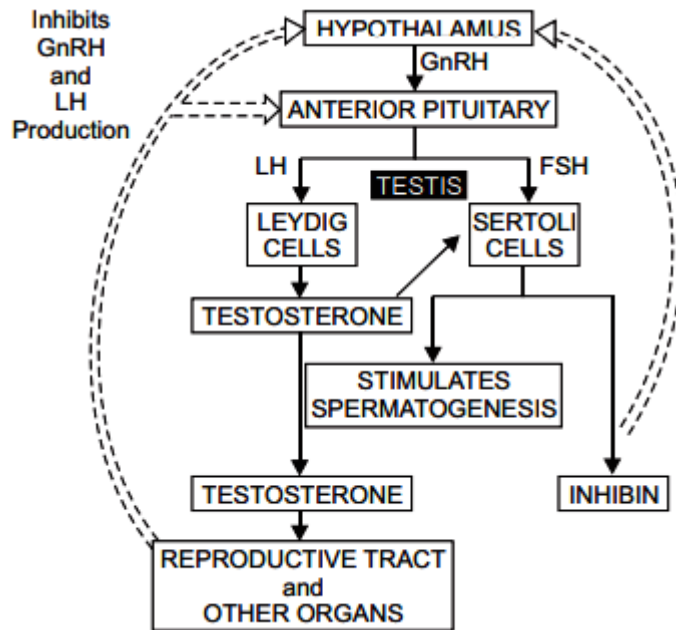
Spermiogenesis

Spermiation

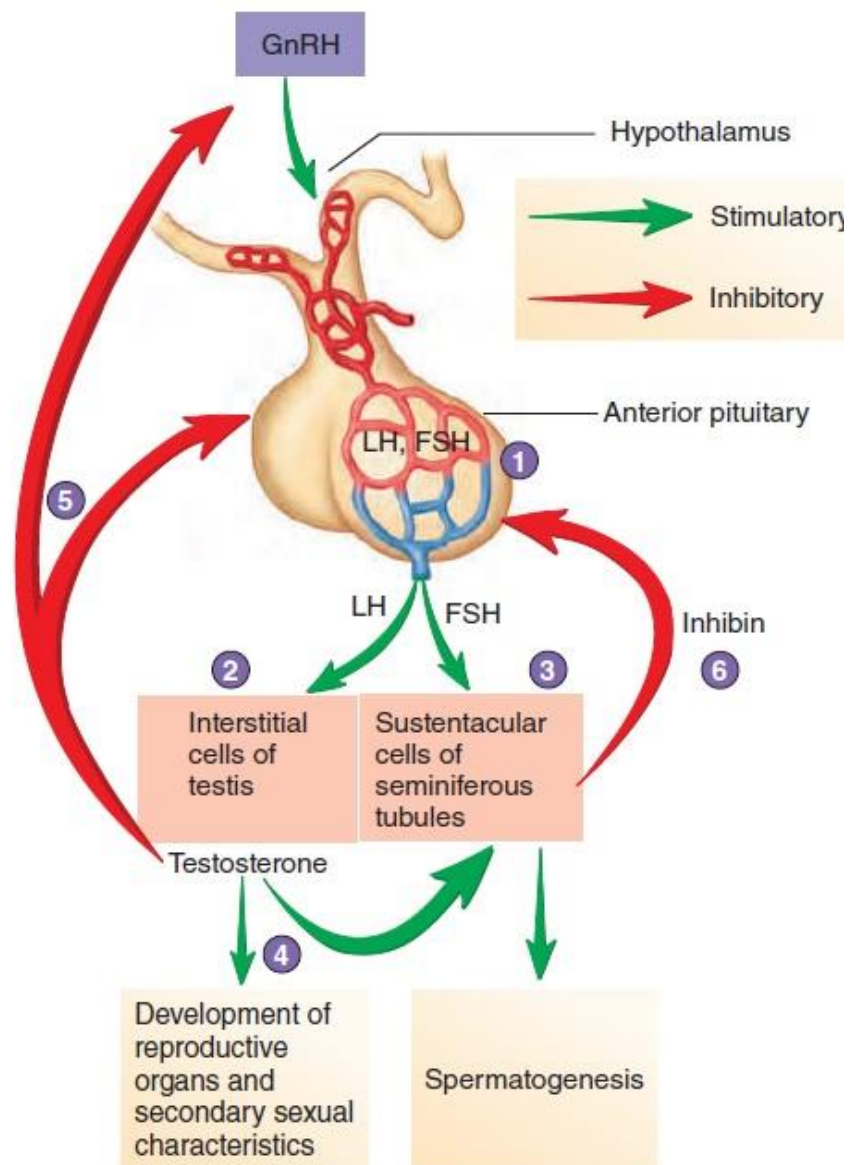
- Breakdown of Sertoli cell-sperm cell junctions



FUNCTION OF GONADOTROPIN RELEASING HORMONE (GnRH)



- 1 Gonadotropin-releasing hormone (GnRH) from the hypothalamus stimulates the secretion of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) from the anterior pituitary.
- 2 LH stimulates testosterone secretion from the interstitial cells.
- 3 FSH stimulates sustentacular cells of the seminiferous tubules to increase spermatogenesis and to secrete inhibin.
- 4 Testosterone has a stimulatory effect on the sustentacular cells of the seminiferous tubules, as well as on the development of reproductive organs and secondary sexual characteristics.
- 5 Testosterone has a negative-feedback effect on the hypothalamus and pituitary to reduce GnRH, LH, and FSH secretion.
- 6 Inhibin has a negative-feedback effect on the anterior pituitary to reduce FSH secretion.



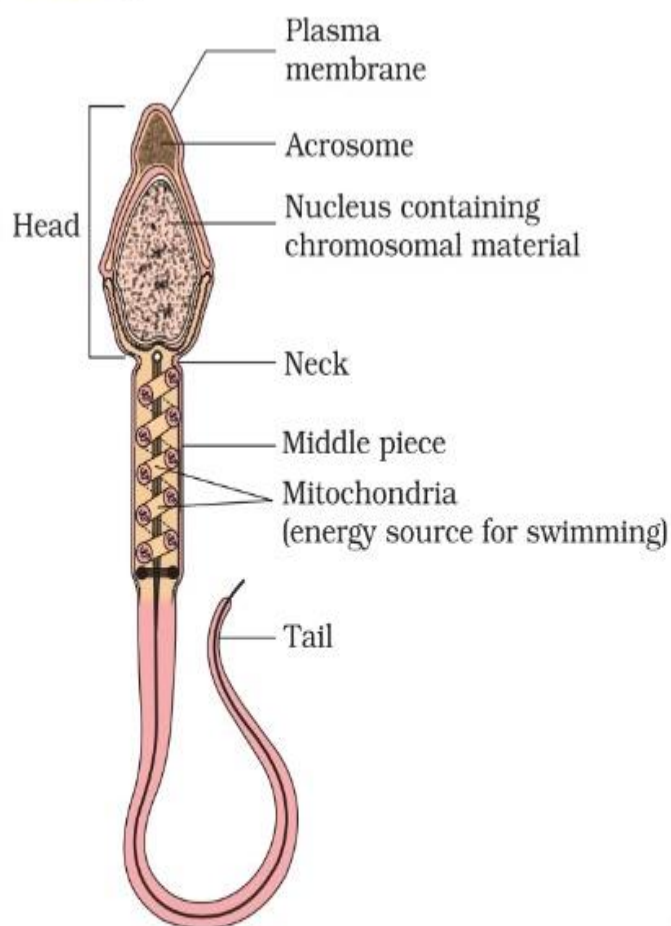
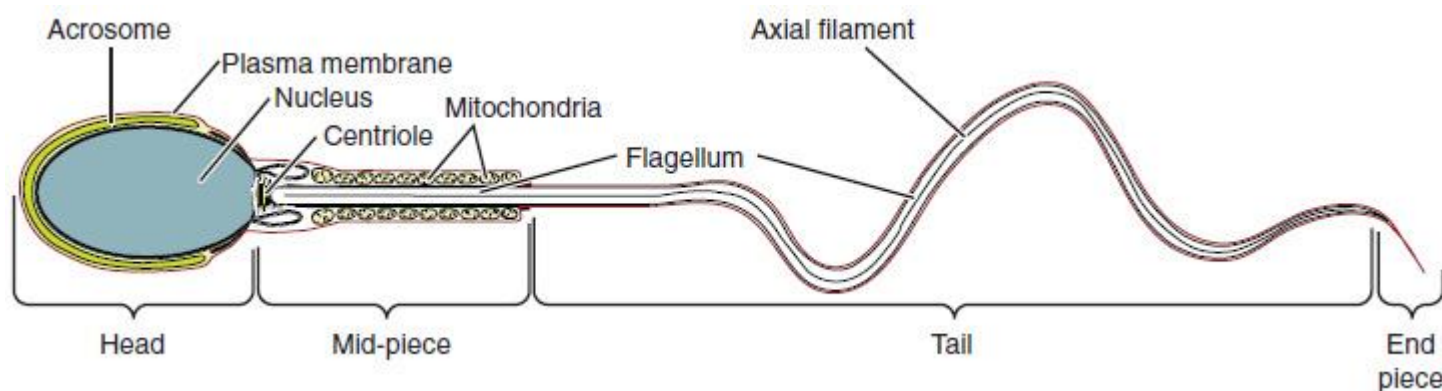


Figure 3.6 Structure of a sperm

secretion of some factors which help in the process of spermiogenesis.

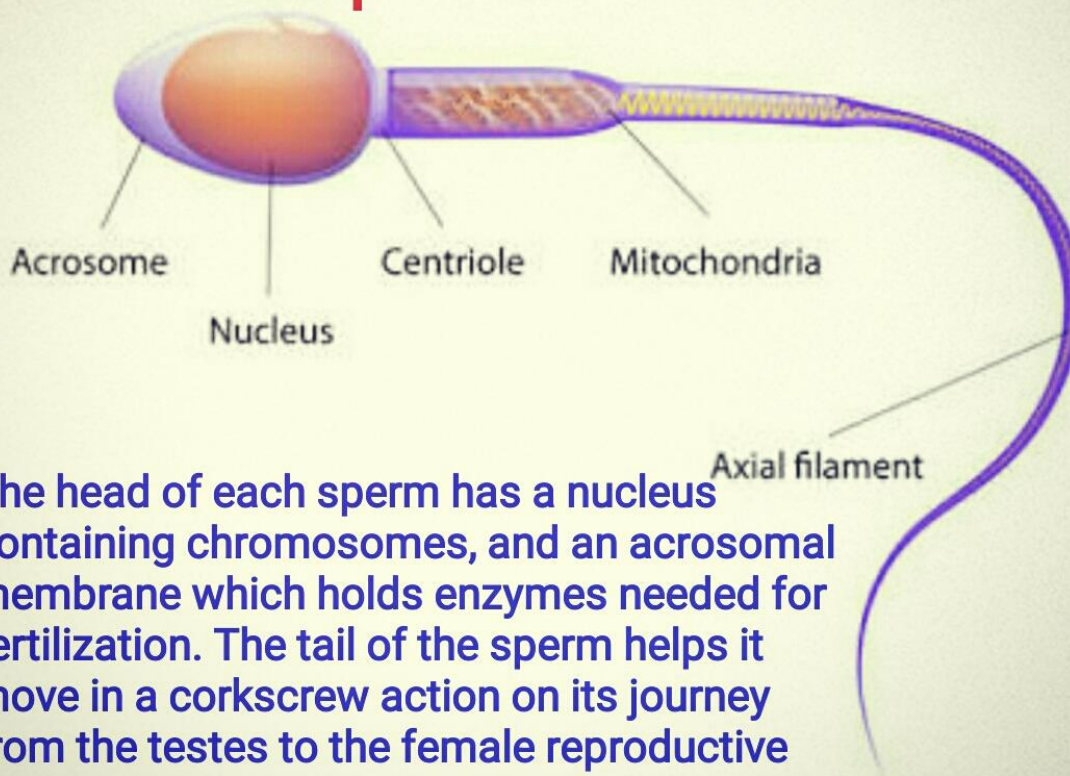
Let us examine the structure of a sperm. It is a microscopic structure composed of a **head**, **neck**, a **middle piece** and a **tail** (Figure 3.6). A plasma membrane envelops the whole body of sperm. The sperm head contains an elongated haploid nucleus, the anterior portion of which is covered by a cap-like structure, **acrosome**. The acrosome is filled with enzymes that help fertilisation of the ovum. The middle piece possesses numerous mitochondria, which produce energy for the movement of tail that facilitate sperm motility essential for fertilisation. The human male ejaculates about 200 to 300 million sperms during a coitus of which, for normal fertility, at least 60 per cent sperms must have normal shape and size and at least 40 per cent of them must show vigorous motility.

Sperms released from the seminiferous tubules, are transported by the accessory ducts. Secretions of epididymis, vas deferens, seminal vesicle and prostate are essential for maturation and motility of sperms. The seminal plasma along with the sperms constitute the **semen**. The functions of male sex accessory ducts and glands are maintained by the testicular hormones (androgens).



SPERM CELL

Sperm structure



The head of each sperm has a nucleus containing chromosomes, and an acrosomal membrane which holds enzymes needed for fertilization. The tail of the sperm helps it move in a corkscrew action on its journey from the testes to the female reproductive organs.